

Comparison of difference in perception between Orthodontists and laypersons in terms of variations in buccal corridor space using Visual Analogue Scale

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Abstract

Introduction: Orthodontics has undergone a paradigm shift with a focus of treatment on facial aesthetics. Buccal corridor show has always remained a controversial aspect of smile aesthetics. As orthodontists often expand the arches as a mean of gaining space, it is of interest to know how the amount of tooth display affects smile attractiveness. The objectives of this study were to compare the difference in perception of orthodontists and laypersons to altered smile aesthetics, specifically with regards to buccal corridor show.

Material and Methods: This was a cross sectional study carried out in the OPD of Islamic International Dental Hospital, Islamabad from September 2011 to March 2012. A frontal smiling photograph was obtained from a non-orthodontic female patient with a pleasing smile. Using computer software Adobe Photoshop 7.0 (San Jose, Calif), the smile was digitally altered to create different variations of the normal buccal corridor space. For the main survey the photographs were projected as a power point presentation to orthodontists and laypersons (n =46). The raters were asked to score the overall appearance of the photographs using visual analogue scale from 1 to 10.

Results: There was no significant difference in the perception between orthodontists and laypersons for variations in buccal corridor (p < 0.05). Both groups preferred smiles with minimal buccal corridors.

Conclusions: Laypersons and orthodontists preferred smiles with absent or minimal buccal corridors. There is no gender or age group difference in buccal corridors (BC) attractiveness.

Keywords: Smile; Soft tissue paradigm; Attractiveness

Introduction

Physical attractiveness plays an important role on perception.¹ Dentofacial attractiveness is a major determinant of

overall physical attractiveness.² Smile ranks second only to the eyes as the most important feature in facial attractiveness.³ In this context the importance of an attractive smile cannot be underestimated. Facial attractiveness has been associated with many (social) advantages in life e.g. popularity, acceptance and social competence.⁴ Orthodontic patients and their parents expect that orthodontic treatment will improve their dentofacial aesthetics and consequently their popularity and social acceptance.^{1,2,4} Recently the field of orthodontics has experienced a “paradigm shift” to focus more on aesthetics with specific emphasis to the peri-oral soft tissues.⁵ Both orthodontists and laypersons are able to use visual analogue scales (VAS) to judge facial aesthetics from photographs in a more or less intuitive way, although facial

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aesthetics seem to be subjective.⁶ The decision of teenagers to undergo orthodontic treatment seems to be motivated by social norms and the beauty culture in their reference group and the society in general. This means that the opinions of laymen are an important parameter in determining the success of an orthodontic treatment.⁷⁻⁹ In smile aesthetics, two transverse characteristics; smile arc (SA) and buccal corridors (BC) have gained great interest recently. Arch width reduction by premolar extractions decreases the buccal corridor ratio and leads to black triangles at the corners of the mouth during smiling.¹⁰ Some studies show that variables related to the buccal corridors or other measures of the relationship between the widths of the dentition and of the mouth during a smile showed no relationship to extractions, whereas other studies contradict this finding.¹¹

Despite extensive research on facial aesthetics, scarce literature is available that attempts to relate the layperson's perception of facial aesthetics to objective facial and dental parameters in the Pakistani population. Hence the purpose of this study was to evaluate, using digitally manipulated images, the effects of changes in buccal corridors and their interactions on the perceptions of smile attractiveness as judged by orthodontists and lay raters in our local population.

Material and Methods

After obtaining approval from ethical committee and informed consent from the participants, a frontal smiling photograph was obtained from one female possessing a pleasing smile that reported to the outpatient Department of Islamic International Dental Hospital. The photograph was taken with Sony Cyber shot (Osaka, Japan) at a distance of 2 meters zooming in on the smile keeping the nose tip and soft-tissue pogonion and zygomatic prominences in frame. The

photograph was digitally manipulated using Adobe Photoshop 7.0 (San Jose, California, USA) to create different variations of the normal buccal corridors. This was done by altering the original smile (8% buccal corridors) so that the buccal corridors occupy 0%, 4%, 12% and 16% of the total oral-commissures (Figure 2). This is two standard deviations above and below the original smile, where one SD is 4%.¹² Male set of photographs was created by using an overlay to create typical facial hair.

For the main survey the photographs were projected with a projector (Philips multimedia projector, Amsterdam, the Netherlands) to orthodontists and laypersons (n= 46) as a power point presentation. Ten slides were projected for a total of five minutes. Each slide was projected for 30 seconds. The panelists were given the proforma (Annexure 2). They were asked to rate the overall appearance of the smiles projected in each slide, using visual analogue scale (VAS) ranging from 1 to 10 (1 = worst; 10 = very good). The VAS was briefly explained to the panel members before the commencement of evaluation.

Results

Of the 92 participants 48.9% were males and 51.1% were females. The 92 respondents were divided into two groups of orthodontists and laypersons. Out of the 46 orthodontists 54.3% were males and 45.7% were females. In the layperson group 43.5% were males and 56.5% were females. The mean age of orthodontists was 32.1 ± 6.4 and the mean age of laypersons was 27.1 ± 7.5 .

Figure 1 shows the mean values given by orthodontists and laypersons for the buccal corridors. The layperson group's highest score was given to slide 5 having the smile with buccal corridor ratio 0.92. This shows that laypersons preferred the smile with average buccal corridor space present, i.e neither too broad nor a too narrow smile. The orthodontist group highest score was given to

slide 4 having smile with buccal corridor ratio 0.96. This shows that orthodontists preferred a broader than average smile.

Table I shows the results for the comparison between the laypersons and the orthodontist for buccal corridors. No significant difference was observed for both groups for the most preferred and least preferred smile ($p > 0.5$). Layperson group rated the average buccal corridor smile (Slide 5) as the highest whereas the orthodontists group rated the broader than average smile as the highest (Slide 4). Significant difference was found for Slide 10 ($p = 0.003$) having smile with buccal corridor ratio 0.84. The laypersons group gave an overall higher mean score as compared to the orthodontists group.

Discussion

Buccal corridor size has been a controversial aspect of smile attractiveness. It is defined as the space between buccal surfaces of maxillary teeth and the corners of the mouth during smile. Because orthodontists often expand arches to alleviate crowding, it is important to know how changes in the tooth display while smiling affect facial attractiveness. Various studies have been done that show a narrower smile to be more aesthetic than a broader smile, hence warranting extractions to relieve crowding rather than expansion.¹³⁻¹⁶ In order to provide useful clinical guidelines, it is important to determine whether orthodontists and laypersons perceive buccal corridors differently.

Both orthodontists and laypersons were shown the same set of photographs. There were 92 respondents in all with equal gender distribution. The orthodontist group consisted of post graduate orthodontic specialists and orthodontic residents with a minimum of three years of experience in the field. The laypersons group included respondents from well-educated and good socio economic background, with at least a bachelor's degree in any field unrelated to dentistry, hence having no knowledge of

buccal corridors and smile arc. The laypersons group was selected to represent population segment sentient of their own aesthetics.

The visual analogue scale was used to judge attractiveness in an efficient and simplified manner.¹⁷⁻¹⁹ A continuous scale was used rather than restricting the respondents to categories. Scale might confound the perception of raters hence all responses might not be equal. To overcome these limitation the scale was defined i.e., the scale ranged from 1 to 10 with 1 being least attractive and 10 most attractive and the study used an adjusted mean to compare ratings across groups.

The results of our study showed that broader smiles with minimum buccal corridor space were preferred by both orthodontist and laypersons. This was in accordance with that of Moore et al.²⁰ They used full face slides and altered the maxillary dentition to 5 widths. The results of their study also showed that broader smiles were preferred.

The results of this study also agreed with that of Parekh et al.²¹ Significantly lower ratings were found for smiles with flat smile arcs and excessive buccal corridors agreeing to this study. Loi et al used a single digital photograph and altered the buccal corridor digitally in 5% increments ranging from 0 to 25 %.²² Their results also showed that both orthodontist and laypersons preferred broad smiles with less buccal corridors.

This study results also corroborated results of Martin et al who also concluded that orthodontists and laypeople rated smiles with small buccal corridors as more attractive than those with large buccal corridors.¹² Husley's²³ study proved that smile arc had higher scores and buccal corridors did not have any effect on smile aesthetics partially contradicting to the present study. The disparity might be due to the BC measurement method. A flat smile arc will reduce the attractiveness of any male or female smile regardless of the buccal corridor size. The raters in this study found

no differences in buccal corridor except when the increments were towards the larger size. Our results differed from those of Roden-Johnson et al²⁴ who evaluated digital frontal smiling photographs. They too measured the buccal corridor ratio as the distance from the distal of the canine to the junction of the upper and lower lip. Each smile was evaluated twice, once with buccal corridors present and once without. Orthodontist, laypersons and dentist all evaluated the smiles differently. Our results differed with those of Kokich et al, who found that laypersons, dentists and orthodontists have different levels of detection of changes in smile characteristics and that laypersons were the most forgiving.²⁵

Studies contradicting the impact of BC's on attractiveness have based measurements between inter-canine widths as the measure of BC which usually does not reflect the width of the dental arch and might be confounding the results of smile aesthetics.^{10,26}

The current study altered only the BC ratio for smiles which eliminated the possibility of other confounding aesthetic variables influencing perceptions. Although orthodontists and laypersons had similar tendencies for rating buccal corridor preferences, the orthodontist preferred broader smiles compared with laypersons. These results suggest that it is important to

consider the perception of laypersons in determining orthodontic treatment goals. Therefore if the orthodontist's perception of aesthetics is not congruent with the patient's perception, the result might not be acceptable to the patient. However, it does not mean that every patient is treated with broad arch wires to have broad arches. The original arch form should be taken into consideration in order to prevent post treatment relapse.²⁷ Therefore during diagnosis and treatment planning it is not only important to evaluate the dental arch width or form but also the alveolar bone width. The results indicate that gender and age do not affect the perception of BC size. The lack of gender difference agrees with surveys of laypeople evaluating smile aesthetics.^{28,29} Even though the photographs were randomized, there was a possibility of an order effect. This was controlled by randomizing the order for each judge.

Conclusions

1. Laypersons and orthodontists prefer smiles with no or small buccal corridors.
2. There is no gender or age group difference in BC attractiveness.
3. Excessive buccal corridors in both male and female smiles are rated as less attractive by both orthodontists and laypersons.

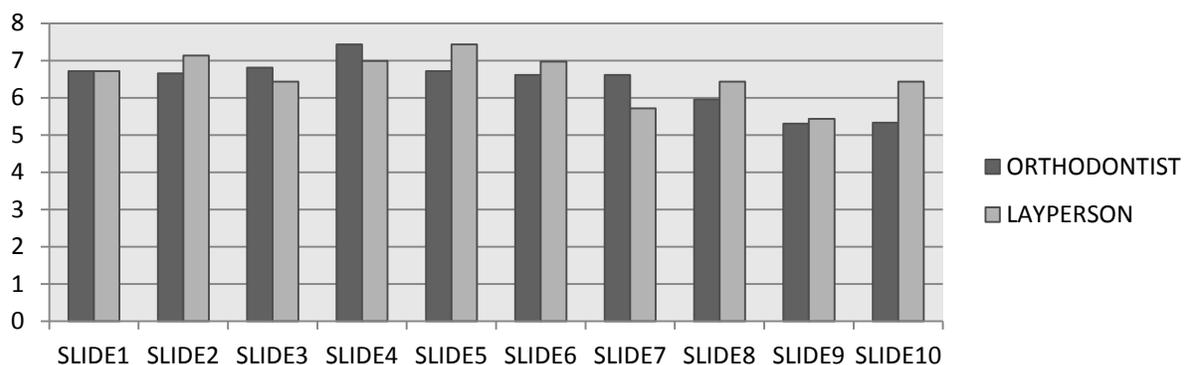


Figure 1: Mean VAS score for BC by orthodontists and laypersons

Table I: independent samples t-Test statistics

Variable	Mean Difference	Std. Error Difference	P value*	Significance
Slide 1: BC 1.0 (male)	.00000	.38864	1.000	NS
Slide 2: BC 1.0 (female)	.47826	.34449	.168	NS
Slide 3: BC 0.96 (male)	-.36957	.40798	.367	NS
Slide 4: BC 0.96 (female)	-.44565	.36749	.228	NS
Slide 5: BC 0.92 (male)	.71739	1.12345	.525	NS
Slide 6: BC 0.92 (female)	.35870	.29989	.235	NS
Slide 7: BC 0.88 (male)	-.23913	.31831	.454	NS
Slide 8: BC 0.88 (female)	.47826	.28969	.102	NS
Slide 9: BC 0.84 (male)	.13043	.33264	.696	NS
Slide 10: BC 0.84 (female)	1.10870	.35808	.003	S

**Figure 2. Buccal corridor variations (female smile)**

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